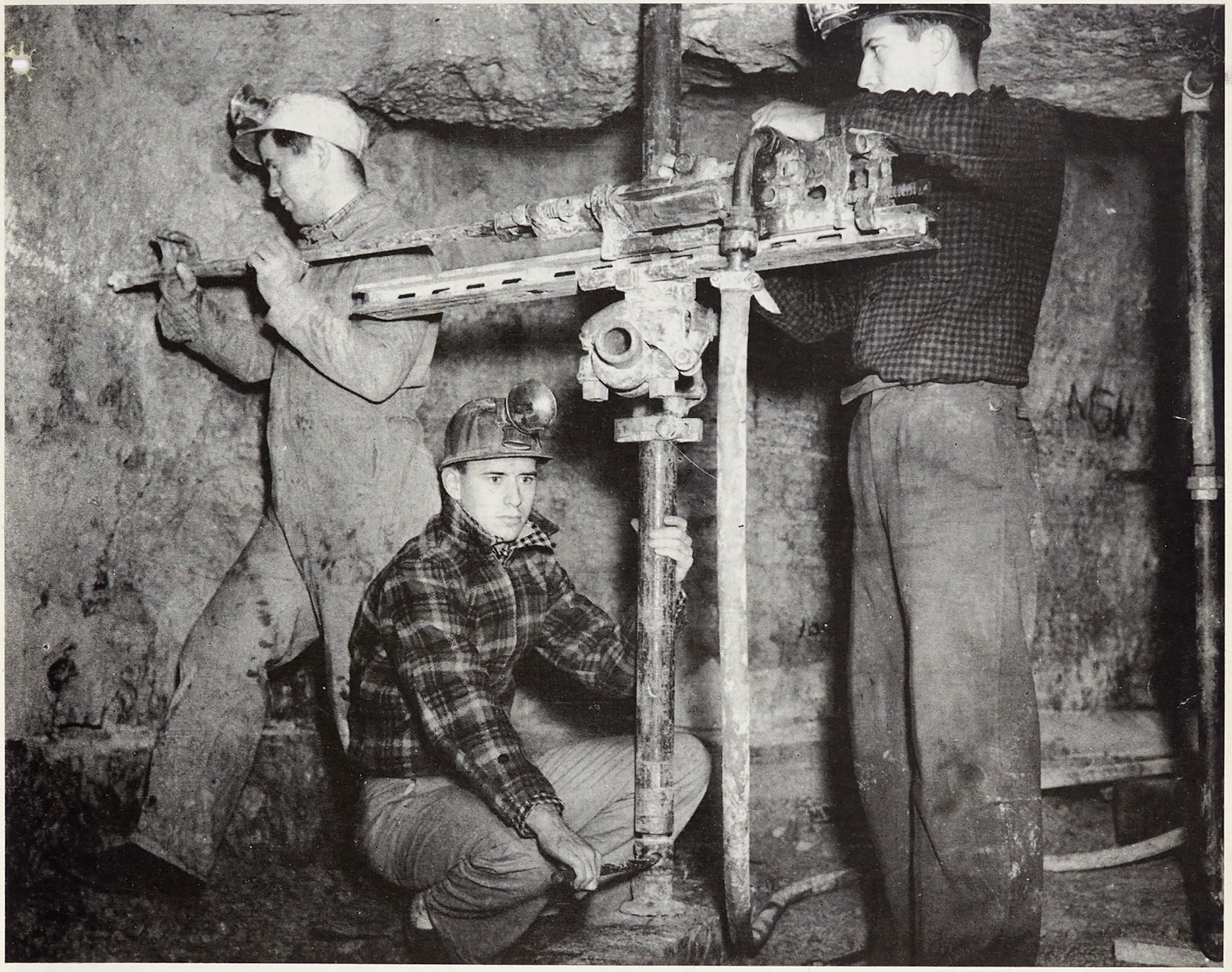
Missouri S&T Magazine, December 1937

Miner Alumni Association

Missouri Mines Dec, 1937

TECHNOGRAM



This Issue •

Mining Utah Copper
Jackling Elected President
Basketball Season
Alumni Notes

• December 1937

ALUMNI BUSINESS AND PROFESSIONAL DIRECTORY

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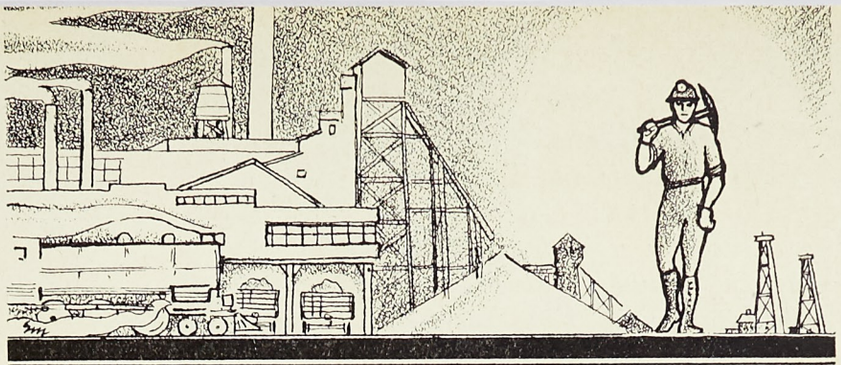
Our many thanks to the MINES MAGAZINE of the Colorado School of Mines for the cuts used in this issue and for the privilege of reproducing their article on Utah Copper.

The Cover

Three Miners at work in the school experiment mine. They are: Ralph Kelly, junior; Lawrence Casteel, senior, and Phil Blazovic, junior.



MISSOURI MINES Technogram

Volume 12 | DECEMBER, 1937 | Number 3

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We call your attention to the subscription blanks enclosed with this issue. Your prompt response will make further issues of the Technogram possible. If you enjoy YOUR *magazine every month* PLEASE *subscribe now.*

STAFF

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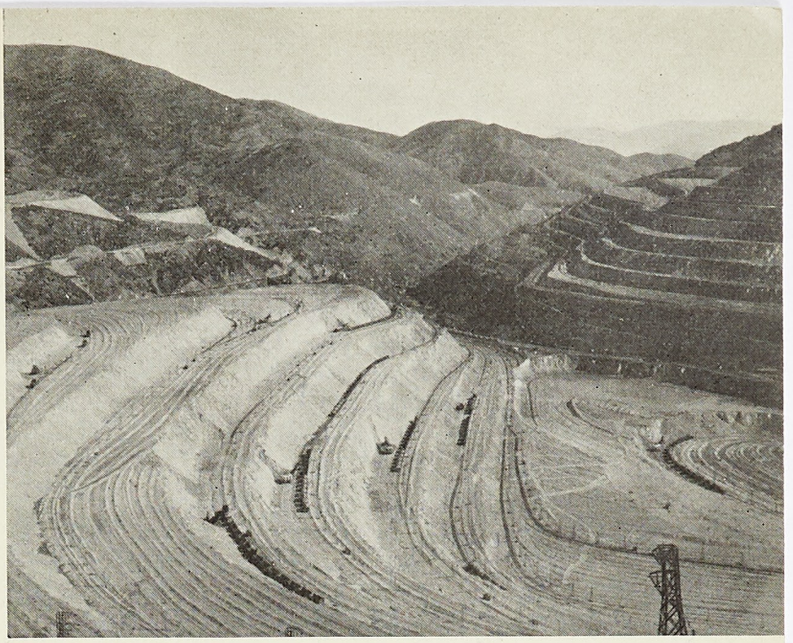
Missouri Mines Technogram is issued monthly from October to June in the interest of alumni and former students of the School of Mines and Metallurgy. Subscription price $1.50. Entered as second-class matter Oct. 7, 1926 at Post Office at Rolla, Mo., under the Act of March 3, 1879.

● *Daniel C. Jackling, prominent MSM graduate and president of the Utah Copper Company, who was recently elected president of the American Institute of Mining & Metallurgical Engineers.*

MINING UTAH COPPER

By D. D. MOFFAT

Vice-President and General Manager
Utah Copper Company



● The Utah Copper Mine from one of the upper levels. Eight of the 27 electric shovels in service are shown. The windrows indicate each shovel cut.

About the year-end of 1893, a tall and somewhat ungainly looking youth of about 25 years of age got off the train at the little station of Divide, 18 miles from Cripple Creek, Colorado. He had but a few months before received the degree of Bachelor of Science in Metallurgy at the Missouri School of Mines and was bound for the Cripple Creek District then in its early stage of development, to look for an opportunity of entering his chosen profession. He was looking for work, the thing he had best learned to do, for, orphaned at the age of one, he had managed to make his way with but little help and finally in major degree had worked his way through college.

Concluding that he had better save what he could of the few dollars he had left, the youth asked a fellow passenger, who was continuing the journey by stage, to take his single piece of hand baggage and he walked the 18 miles to Cripple Creek, arriving there in the dead of winter, a stranger in the heart of the Rockies. Within a few days he succeeded in getting a job in an assay office and so embarked towards a field of engineering practice in which he was destined to become an outstanding figure. That youth was Daniel C. Jackling, and no story of the Utah Coper enterprise is complete without at least a brief account of his part in its development. Neither is it complete without the mention of two Coloradoans who also played an important part in the venture, Charles M. MacNeill and Spencer Penrose, for it was from these men Jackling secured the first capital with which to demonstrate the feasibility of mining and treating an orebody so low in grade that prominent mining engineers and technical periodicals of that day stated it was lower than the mine waste and mill tailings of other important copper mines—that no profit could be made in treating that class of ore.

The Utah Copper orebody is located in Bingham Canyon about 30 miles southwest of Salt Lake City. The geology of the deposit is comparatively simple. Quartzite beds of Pennsylvania age, thousands of feet thick and intercalated with a few narrow limestone beds have been intruded by a mass of manzonite porphyry rather uniformly mineralized with copper and iron pyrite. The commercial orebody is a typical example of secondary enrichment. Meteoric waters dissolved the copper in the upper portions, leaving a red capping, and redeposited it as chalcocite, covellite and bornite, making an enriched zone hundreds of millions of cubic yards in volume and averaging about 1% copper, .01 oz. gold, .10 oz. silver and fractions of a percent in molybdenite. The principal copper mineral, chalcopyrite, though generally primary, also occurs in secondary state.

The deposit was first prospected probably as early as 1862, but the low values encountered were of no interest at that time. In 1887 Enos A. Wall of Salt Lake City found an abandoned tunnel in the deposit and upon examination and sampling, concluded that a large body of low grade copper ore existed. He spent considerable money during the next ten years in development work and finally interested Captain J. R. DeLamar in the property. The Captain was operating a gold property at Mercur, Utah, at the time and had in his employ two young engineers, D. C. Jackling and Robert C. Gemmell. They were sent to Bingham to make a thorough examination of the property and the resulting report was probably the first comprehensive proposal ever made for mining and treating such a low grade sulphide copper orebody on a commercial scale. This was in 1899.

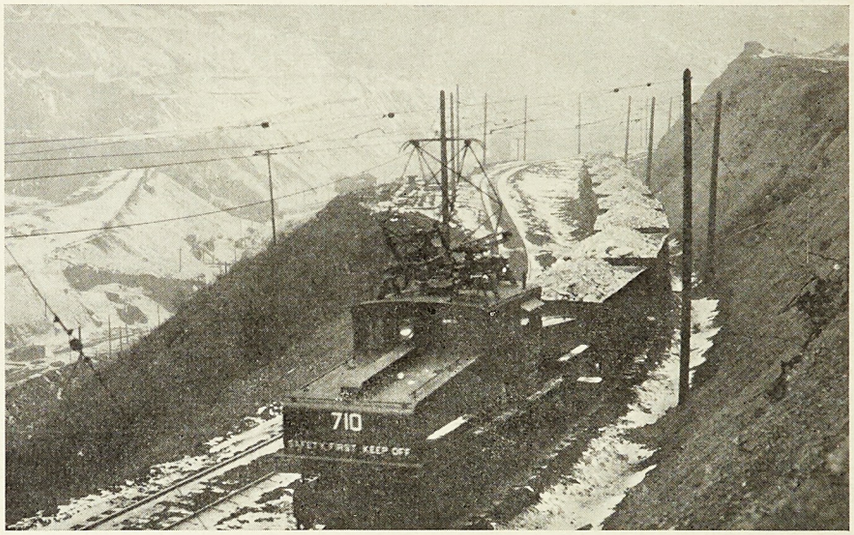
Probably because of the amount of money that was involved to do something that had never been done before, Captain DeLamar did not follow the procedure recommended. Years passed and in 1903 Jackling was again back in Colorado, but he had not given up the idea of working the Bingham deposit and finally succeeded in interesting MacNeill and Penrose in the property to the extent of financing the building of a 300-ton experimental plant to demonstrate the economic feasibility of his concepts. The Utah

● Electric shovel loading ore. This shovel is the old type in service for over a quarter of a century. Originally a railroad type powered by steam, it has been successively improved, first by the application of caterpillar trucks and then electrified. It carries a 4½-yard dipper and loads an average of over 5,000 tons of ore in an eight-hour shift. Note the portable steel transmission and trolley towers.

● Seven tons of Utah Copper ore. Electric shovel, equipped with 5-cubic yard dipper, loading ore at the rate of 16 tons per minute, a loading cycle of two to three complete swings per minute. Note the mine shovel levels in the background.

and material to 0.5% copper is currently treated at a profit despite tremendous advances during recent years in cost of labor and supplies and increased tax burdens. Improved equipment and methods developed through the years since the inception of the enterprise have more than offset these factors.

The mining of over one half billion tons of ore and waste has left a large amphitheater-like pit at the mine, the sides of which are cut into giant steps or benches averaging 70 feet high. There are 23 levels on the west side of the pit and 10 on the east side, covering an operating area of nearly



● Ore train on mine switchbacks enroute to assembly yard. The various shovel levels are connected by switchbacks laid out on a maximum of 4% grades. Trains of 10 to 14 cars are hauled by the 75-ton electric mine locomotives to the main assembly yard at elevation 6340. The top shovel level is at 7700.

Copper Company was organized in 1904, the experimental plant was erected near the mouth of Bingham Canyon and was known as the Copperton mill. The enterprise showed a profit in its first year of operation.

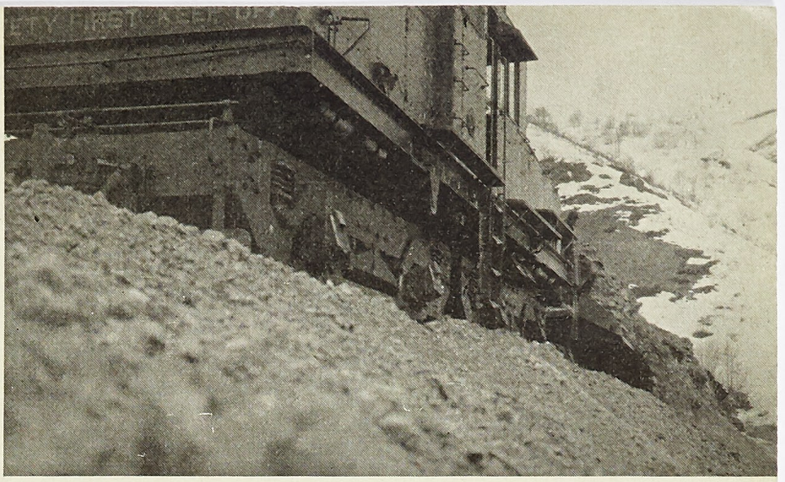
Subsequent events moved rapidly. With experience came improvements and enlargements. A 6,000-ton concentrator, today known as the Magna Plant, was built at Garfield near the southerly shores of the Great Salt Lake, 18 miles distant from the mine, where ample water supply and room for tailings disposal were available. In 1910 the Utah Company acquired the property of the Boston Consolidated Mining Company which owned the upper part of the mountainside copper ore deposit. They had just completed a 3,000-ton concentrator known as the Arthur Plant about 1½ miles distant from the Utah Copper mill. Today these concentrating mills have a capacity of 36,000 and 34,000 tons, respectively, at high metallurgical efficiency and, with the mine, stand as a monument to the vision of Jackling and his associates.

The 1899 report estimated some 12,000,000 tons of 2% copper ore with an additional 25,000,000 tons of probable ore. To date there has been mined and milled 250,000,000 tons of ore averaging 1.14% copper, yielding 4,400,000,000 net pounds of copper. To mine this ore has required the removal of 136,572,000 cubic yards of waste overburden, equivalent to 284,000,000 tons, giving a stripping ratio of 1.12 tons of waste per ton of ore mined. Today the ore mined averages a little less than 1%

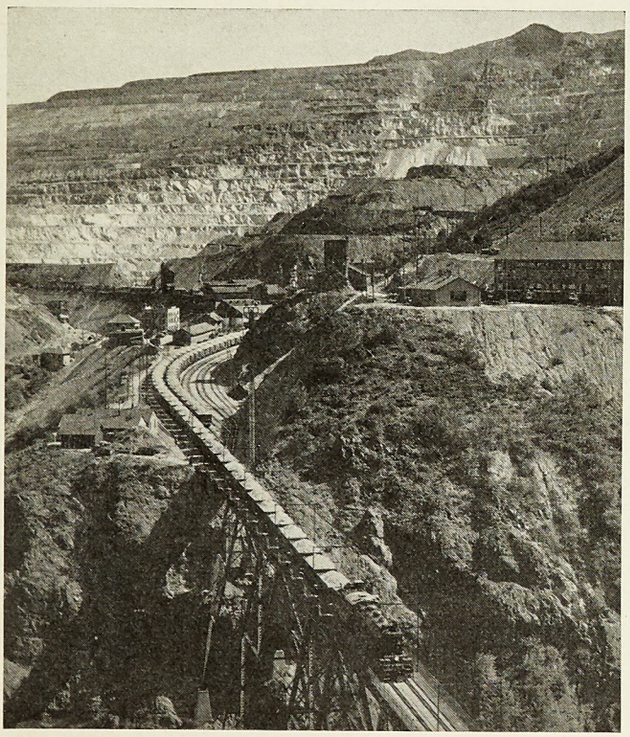
● Loading waste, For every ton of ore mined, an equivalent amount of waste overburden must be removed to maintain safe pit slopes. A rather unusual view from one of the upper mine levels looking down into the pit with part of the east side levels on the opposite side of the canyon in the background.

500 acres. The bottom level is at an elevation of 6,240 feet above sea level with the top of the mountain 1,600 feet higher. The terraces are from 50 to 250 feet wide and over one mile long across the lower levels on the west side of the mine. Future operations contemplate additional levels at 50 foot intervals as the mine is opened up at increasing depth. The present county highway is located across the deeper lying extensions of the orebody. A 7,000-foot vehicular tunnel is being constructed at a cost of over $1,000,000 which will circle the orebody to the east and permit abandonment of the present highway to permit mining of the deep ores.

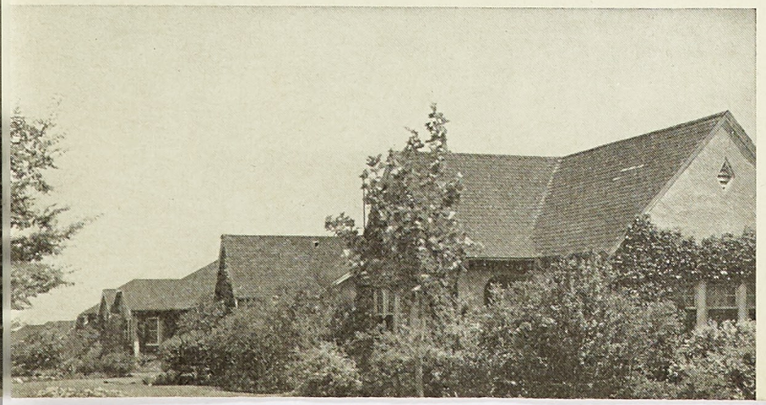
All the ore for the early operations of the experimental mill at Copperton was mined by underground caving methods. In 1906 the first steam shovel was put into operation, but part of the ore for the next seven years continued to come from the underground workings.



● Dumping waste. The waste material is dumped in nearby gulches. A total of 136,600,000 cubic yards of waste has been removed during the course of mining 252,800,000 tons of ore, a ratio of 1.12 tons of waste per ton of ore mined.



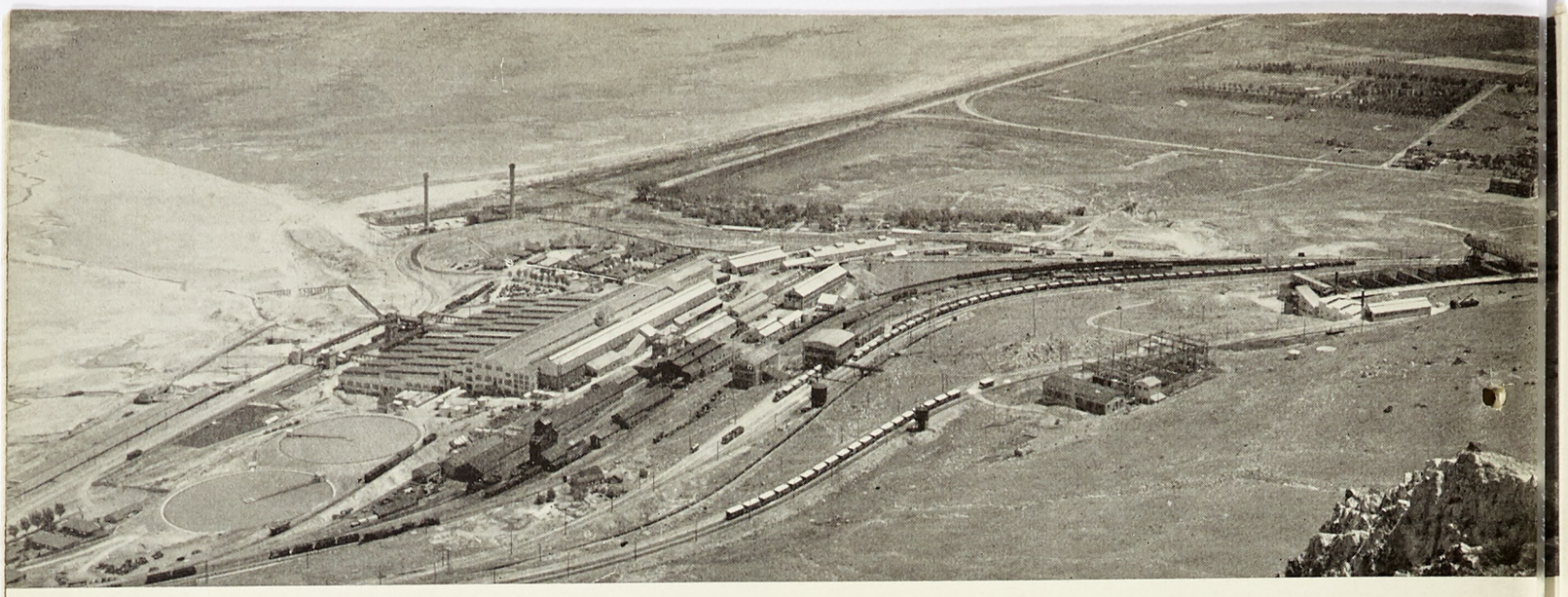
● Ore enroute to the mills. Trains of 50 cars are made up in the assembly yard shown in the picture. 300-ton steam mallet locomotives haul the ore to the concentrators, 18 miles distant, over the tracks of the Bingham & Garfield railway.



● Homes of Utah Copper miners. Copperton, situated at the mouth of Bingham Canyon, 3 miles from the mine, is strikingly different from the usual mining camp. One hundred twenty-seven modern cottages have been built by the Utah Copper Company, furnishing unexcelled housing conditions. Copper has been extensively used in their construction. More houses are in process of erection, carrying out a program contemplated to eventually house all employees desiring such accommodations.

The original steam shovels were of the railroad type requiring the moving of the tracks for them as the shovel cuts advanced as well as for the ore and waste trains. The conversion to caterpillar trucks in the early nineteen twenties was one of the greatest single mine operation improvements. Later the shovels were electrified and the steam locomotives replaced with electric motive equipment. Present production schedules have made necessary the purchase of additional shovels. The new type is full revolving and carries 5-yard dippers compared with 4½ yard capacity on the older shovels. These improvements have increased loading efficiencies from less than 3000 tons in an eight-hour shift to as high as 8000 tons with average figures for the new shovels well over 6000 tons. Resultant cost reductions have not only conserved and increased one of the State's most valuable assets, but have prolonged the duration of a profitable enterprise insuring employment for thousands of men for many years to come.

The mining method of the Utah Copper Company is comparatively simple. What problems are encountered arise principally from the movement of tremendous tonnages of ore and waste. The key to efficient open cut operations is the power shovel—it must be constantly served with cars to insure uninterrupted loading. To keep shovels amply served with cars, two locomotives are assigned to each unit. A carefully laid out switch-back system is, of course, important to facilitate movement of ore trains from the various higher and lower levels to the main assembly yards. Maximum grades are 4%. The waste overburden is disposed of in nearby gulches and usually run out on level lines for short distances from the mine shovel benches but consolidating 2, 3 or 4 levels into one for the longer hauls. Adverse haulage against loaded trains



● Magna Concentrator, Garfield, Utah. View of the larger of the two concentrating mills at Garfield, Utah, which has a capacity of 36,000 tons of ore daily. The Arthur mill is about 1½ miles west of this plant and has a capacity of 34,000 tons. As high as 80,000 tons has been concentrated by these two mills in one day.

is avoided wherever possible. Two outlets, one at each end of a level are also maintained wherever possible. There is a total of 85 miles of standard gauge track on the various levels, dump lines and switchbacks, all electrified. Trolley lines on the switchbacks and other permanent tracks are carried over the center of the tracks and suspended from wooden poles. Catenary suspension is used around curves. On the levels, portable steel towers mounted on skids are used with the trolley line carried to the outer side of the track from the banks so as not to interfere with shovel loading operations. The locomotives are equipped with side arm collectors for operation of the shovel levels, and standard pantograph collectors for use when operating on the permanent tracks with the overhead trolley lines. On the waste dumps, the trolley lines are carried on poles fastened to one of the track ties long enough to carry the pole in the clear from the trains. The trolley system is therefore moved as a unit with the track. All track-shifting on both the shovel levels and the dumps is done by machine. Caterpillar tractors equipped with bull-dozers are used for grading the track bed.

On levels above the main haulage level at elevation 6340, the empty cars are hauled adverse to grade and the 75-ton electric locomotives can handle up to 14 one hundred ton capacity cars per train over the 4% switchbacks. For levels below the assembly yard, the loads move adverse to grade, the trains in these instances being limited to 4 cars. As operations are deepened, outlet tunnels will be driven into the pit at about 250 foot intervals enabling loads to be hauled down grade as is now the practice in the upper levels of the mine.

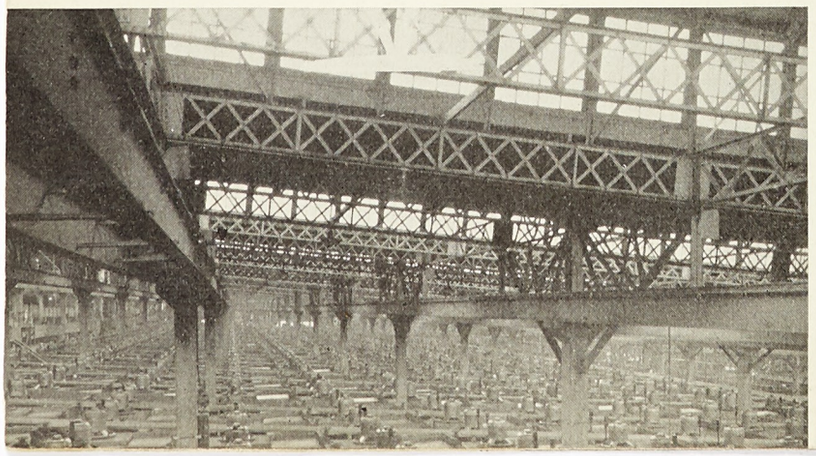
Fifty 100-ton car trains are made up the mine yards and hauled to the concentrating plant 18 miles distant, over the tracks of the Bingham and Garfield Railway. Maximum grades of this road are 2½%, but are down hill with the load, making it necessary to brake the train the entire distance. Brake shoe consumption is therefore necessarily high. At the present production rate, the railroad is handling about 18 rounds trips of fifty car trains each, every 24 hours. At the mine, this means 70 to 75 round trips for the ore haulage averaging some 2 miles in length and the waste trains making about 125 rounds trips, the distance to the dumps ranging from a few hundred feet to 2½ miles. It is evident that a careful train movement control system is necessary to uninterrupted service and signal stations are therefore located at convenient points to regulate train movements.

At present production schedules the mine works two eight-hour shifts and the railroad and mills work continuously through the 24 hours divided into three shifts.

As the shovel moves across the level, the bank of ore or waste is drilled and blasted back of the shovel. After completing a cut across the level, the shovel is turned around and loads back across the level. By this method, a full bank of broken material is always ahead of the shovel.

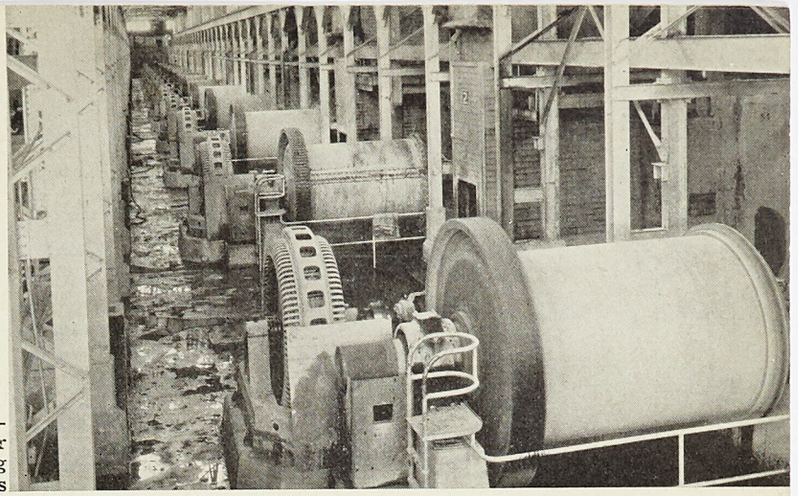
In blasting on upper levels, holes are drilled into the toe of the bank about three or four feet above grade and on an angle to reach 5 feet below grade at a depth of about 23 feet. These are spaced at 15 foot intervals and shot with fuse in any desired number in a series, but usually a round consists of 12 to 18 holes. Shot in series, each blasts blankets the succeeding blast, increasing the breaking efficiency of the shot and prevents excessive throw of rock. For wet holes a semi-plastic dynamite is used and for dry holes ammonium nitrate dynamite. The size of the blast is limited to the reach of the shovel and by the room between the banks and the haulage tracks. Too heavy a blast will not only cover the loading tracks, but will break the bank beyond the reach of the shovel. It is important to keep the toe of the bank clean to facilitate

● Flotation sections, Magna Plant. The copper circuit consists of 60 rows of 11 cells to a row, a total of 660 cells, each powered with a 7½ h.p. motor. In addition to the copper circuit there is an experimental section of two rows and at the farther extreme background of the photo is the newly installed molybdenum plant. While still in the experimental stage, Utah will eventually prove an important producer of this metal.



drilling for the next cut. About 1500 tons of material is broken per toe hole drilled, the average powder consumption being about one pound per 8 tons of ore loaded. In cases where the bank does not break to the top, secondary blasting is necessary to trim off any overhanging edge.

With the opening up of the so-called "sub-levels," i. e., the levels below the main train assembly yards at elevation 6340, a different drilling and blasting procedure has been made possible. Contrasted with the 70 foot bench heights for the upper levels and the necessity of limiting the width of the benches so as not to have too flat an overall pit slope which would make for excessive stripping ratios, the bench height for the sub-levels is 50 feet, and during opening up operations bench width range up to several hundred feet. Slopes here are not an element to be considered, the only limiting factor being the loading reach of the shovel. With the lower banks, the throw of the blast does not cover the loading tracks. The full revolving shovels, which are being used on this lower work, have a digging and loading reach of 74 feet which permits heavier blasts than those employed on the upper levels. To most effectively perform the drilling operations under these conditions, vertical holes are drilled with a portable electric churn drill. The holes are drilled to bottom 10 feet below grade about 37 feet in from the toe of the bank. The bottom 3 feet usually fill up with rock that falls into the hole so that charge is actually placed about 7 feet below grade. The placing of the charge below grade is necessary in order to break the entire bottom to the toe and eliminate a "hard bottom' for the shovel. Another advantage here in favor of vertical holes is that with room permitting, practically any number of holes can be drilled without any interference with shovel operations. These holes are shot electrically and simultaneously. A 35,000 pound blast of 44 holes was recently shot.



● Ball mill section, Arthur Plant. Crushing and grinding is an important operation in the treatment of a low grade ore. At Utah, grinding is held to about 15% plus 100-mesh screen at current tonnages and averages about 50% minus 200 mesh.

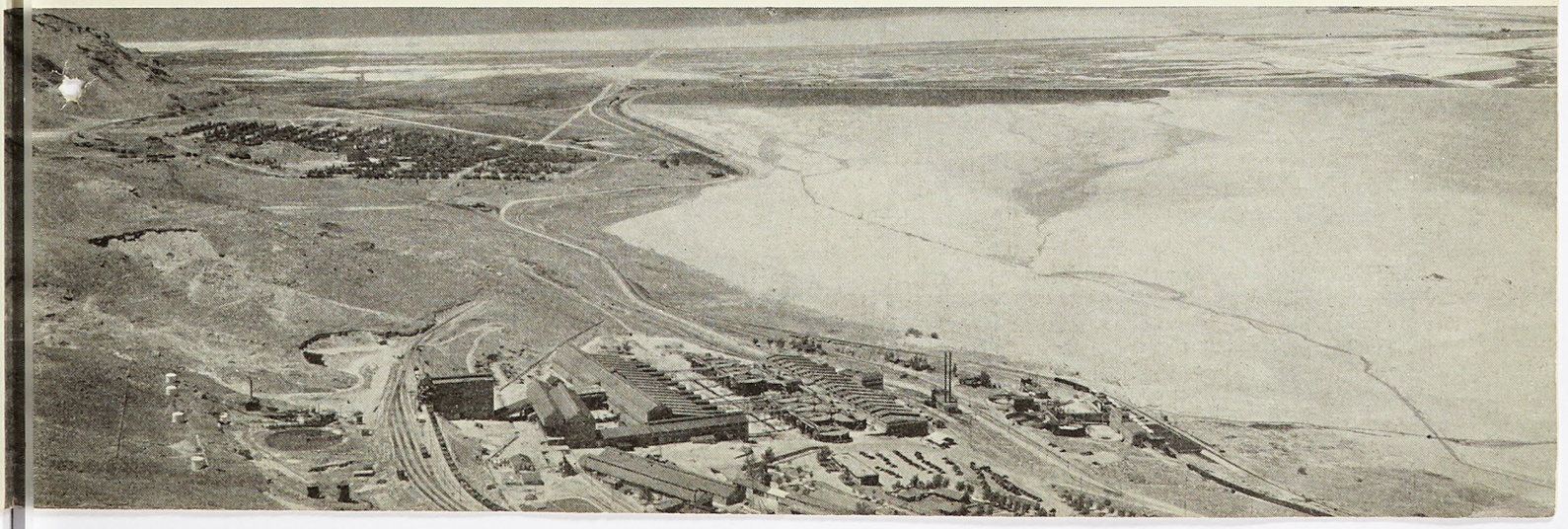
In general, blasting is not a serious problem at the Utah mine, the rock usually breaking into pieces no more than a foot in diameter. It is not uncommon to load a trainload of ore with but few pieces larger than 8 to 10 inches in diameter dimension.

That operations at Bingham are highly coordinated and reflect efficient supervision as evidenced by recent production figures. During August an average of 75,000 tons of ore was loaded per day and for the same month a total of 4,899,000 tons of ore and waste was removed, equivalent to an average of 163,300 tons of material in 16 hours per day. Over 173,000 tons have been loaded in one day. These results have been obtained operating 35, 8-hour shovel shifts in a calendar day, 15 of which were night shifts.

It is not within the scope of this paper to go into a detailed description of milling practices at the Garfield concentrators—suffice to say, however, that paralleling the progress made in mining equipment and coordination at the mine, milling practice has been improved to even a greater degree. Running the gamut of jigs, tables, vanners, etc. to flotation and of continued improvement in crushing, grinding and classifying equipment and practices, recoveries have improved until today milling extractions are well over 90% with the concentrates averaging about 35% copper and a ratio of concentration of close to 40:1.

An interesting new development involving more problems is the recovery of molybdenum in the form of a molybdenite concentrate. With heads averaging only .04% MoS_2, the production of a high grade molybdenite concentrate low in copper is proving both interesting and profitable. While yet in only an advanced experimental stage, this innovation will eventually make Utah an important source of molybdenum.

Just as this story began with a youth facing a life of problems, so does it end with an enterprise which after a third of a century is still fraught with its daily problems, arising from initiative ever on the alert and striving for improvements, and so it will continue to be for scores of years to come.



● Arthur Concentrator, Garfield, Utah. The town of Garfield appears in the left background and the Great Salt Lake in the distance.

Miner Sports ∴ [by B. C. Compton]

FOOTBALL SCHEDULE

1938

Sept. 30—St. Louis University at St. Louis
Oct. 8—Chillicothe Business College (Father's Day)
Oct. 14—Maryville at Maryville
Oct. 22—McKendree
Oct. 29—Cape Girardeau (Home Coming)
Nov. 4—Kirksville at Kirksville
Nov. 11—Springfield at Springfield
Nov. 18—Warrensburg

The Miners brought to a close on Thanksgiving Day their 1937 football campaign by going down under a 16 to 6 defeat at Cape Girardeau, the Indians annexing the Missouri Intercollegiate Athletic Association title as the result of their victory.

The Miners played a heady game during the first half but were unable to cope with 175-pound George Godwin, the husky Indian quarterback who made all-conference and Little All-American mention. Coach Abe Stuber's eleven were overwhelming favorites to win the game and lost little time in taking advantage of the fact. Godwin broke loose in the first half and galloped 68 yards for a touchdown, to put the Indians ahead.

The Miners came back fighting during the waning minutes of the second period and went over for their only score. However they failed to make the extra point and as the result Cape led at halftime, 7 to 6.

Jim (Buzz) Taylor set things up for the Miner counter when he caught a pass and raced to the Cape five-yard stripe before he was hauled down. Alger Pomeroy then went over on a line buck.

In the second half Godwin again broke loose and went 58 yards for his second touchdown. The kick for the point was blocked and before the Miners could down the ball a Cape player had picked it up and ran it over the line.

Late in the fourth quarter Walter Koziatek, Miner signal caller, was caught behind his own goal line when he caught a punt and Cape scored a safety. The game was hard fought throughout, with the Miners having a slight edge in yards gained from scrimmage and first downs.

As an aftermath of the season Richard Prough, Miner tackle and acting captain, was picked by the coaches on the all-conference team. Irvan Curtis, guard; Walter Koziatek, quarterback, and Otis Taylor, halfback, were given berths on the second all-M. I. A. A. team.

Only three men will be lost by graduation although the Miner coaches expect the annual 33 per cent turnover in material. They are Prough, Joe Murphy, end, and Carl Lintner, end.

The following men were awarded letters: Preston Axthelm, Walter Baumstark, Dick Cunningham, Irvan Curtis, Jack Flannary, Don Hart, Jim Kiesler, John Kirwan, R. G. Klug, Harley Ladd, Carl Lintner, Loveridge, Walter Koziatek, Joe Murphy, Richard Prough, F. B. Rogers, Joe Spafford, R. A. Stallman, J. W. Stephens, Otis Taylor, J. H. Taylor, Jim Wilson and Harold Volkmar.

Major sport letters were awarded to managers H. W. Kuhlman and Jack Long. Gold footballs for four years of service were awarded to Prough and Murphy.

The annual football banquet was held on Dec. 8 at the Hotel Edwin Long. The speakers were Coaches Bullman and Gill, Captain Melvin Nickel and Mr. Robert Finch, a member of the St. Louis Cardinal baseball organization.

The basketball season for 1937-38 got underway the previous night with the Miners taking the Central Wesleyan five into camp, 39-27. However, after that the Miners ran into a string of three defeats losing to Drury, Westminster and their first conference game to Cape Girardeau.

1937-38 BASKETBALL SCHEDULE

Jan. 28—Warrensburg at Rolla
Feb. 1—Springfield at Springfield
5—Warrensburg at Warrensburg
8—St. Louis at St. Louis
12—Springfield at Rolla
14—Cape Girardeau at Rolla
21—Kirksville at Kirksville
22—Maryville at Maryville
24—St. Louis at Rolla

WOMMACK-TERRILL

Winston Wommack, '37, and Miss Mary Ruth Terrill were united in marriage on Dec. 1 in the First Baptist Church of Springfield, Mo. Dudley Folsom, '38, was the best man and Mrs. Raymond Terrill was matron of honor.

A small reception at the Terrill home followed the ceremony. The bride cut the first piece from her three-tiered wedding cake, which was surrounded by sweetpeas. The immediate families and guests from out-of-town were the only ones present.

Besides Mr. Folsom, Mr. and Mrs. K. O. Hanson, '36, were present. The couple will reside in St. Louis after a short wedding trip.

ALBERT H. FAY

Albert H. Fay, '02, died on Aug. 7. He had been suffering from a chronic ailment for two or three years, and finally was operated on at the University of Pennsylvania Hospital on Aug. 2, from which operation he never recovered. Interment was made at Westboro, Mass.

Mr. Fay was born in Missouri on March 12, 1871. He first took a business course and later engaged in clerical work for the Copper Queen Consolidated Mining Co. at Bisbee, Ariz. This led him to take the mining engineering course at the Missouri School of Mines, from which he graduated with a B.S. in 1902. He then came to New York as an assistant in the office of the Secretary of the A. I. M. E., Dr. Raymond. In 1903, he went to Cananae, Mexico, as mining engineer for the Cananea Consolidated Copper Co. Later he went to Alaska as superintendent for the Bartels Tin Minning Co., and from 1907 to 1908 was at Bristol, Tenn., as mining engineer for John T. Williams and Son.

The next three years Mr. Fay spent again in New York on the editorial staff of the ENGINEERING AND MINING JOURNAL, and as editor of Vol. 19 of "The Mineral Industry." From 1911 to 1920, he was with the Bureau of Mines in Washington, preparing several of its important bulletins. The next three years found him heading the natural resources division of the Internal Revenue Bureau. From 1923 to 1925, he was engaged in consulting work, following which he was again assistant editor for the E. and M. J. for two years under Spurr. After leaving that job he was in Russia for a year. For the last few years he has been assistant professor of mining engineering at Lafayette College, Easton, Pa.

Professor Fay's most notable work was the compilation of Bulletin 95 of the Bureau of Mines—"A Glossary of the Mining and Mineral Industry," defining 20,000 terms. It was an excellent job and ever since it was published has been the standard reference work on the subject. Originally sold for 75c, copies now are worth in the neighborhood of $10.

In his long professional career and while at Lafayette, Fay made many friends who will regret the passing of a capable engineer and a most likeable personality. His son, Albert H. Fay, Jr., carries the name along on the rolls of the A. I. M. E.

J. E. PEARMAN

J. E. Pearman, ex '18, Cashier of the American Zinc Company, Mascot, Tennessee, died October 13 of a heart ailment at Barnes Hospital in St. Louis, Missouri, where he had been undergoing treatment for the past three weeks. Mr. Pearman was 46 years of age. He leaves his wife, Marie Smith Pearman, and two daughters, Carrie Elizabeth and Martha Lee, of Mascot. Funeral services were held at his boyhood home, Carthage, Missouri, at the Nell chapel, Friday afternoon.

Mr. Pearman was quite well known in Sweetwater valley, where he resided for a number of years before coming to Mascot. He was a member of the First Presbyterian Church, Knoxville, and a member of Mascot Lodge, F. and A. M. Mrs. Pearman was with Mr. Pearman at the time of his death.

The Pearman family lived in Sweetwater about ten years while Mr. Pearman was in the baryte mining business. Their daughter Martha Lee was born here. Their many friends here have been deeply concerned about Mr. Pearman's condition for several months. He became ill in July and spent more than two months in Fort Sanders Hospital in Knoxville.

Alumni News Notes . . .

by C. Y. Clayton

1915

D. W. Blaylock is with the Fleming Coal Company, 310 South Michigan, Chicago.

Paul E. Gildehaus, ex '15, died on January 1st, 1938 at 7:20 p. m., He was the beloved husband of Nana Phelan Gildehaus, dear father of Mary Frances, Paul, Jr., and David Gildehaus, brother of Ralph F. and the late Harry and Maude Gildehaus. Funeral from residence, 6251 Washington Blvd., on Tuesday, January 4th, at 8:30 a. m. to St. Roch's Church, Rosedale and Waterman. Interment Bellefontaine Cemetery.

1921

Mr. and Mrs. Herbert W. Mundt, '21, announce the birth of a daughter, Barbara Ann Henrietta, Friday, November 5th, 1937, Fort Peck, Montana.

Felipe B. Ore is at present working for Compania Aurifera Nazca, Nazca, Peru as General Mine Foreman. He may be addressed P. O. Box 4, c/o Cia. Nurifera Nazca, Nazca, Peru.

1922

J. S. Irwin, Consulting Geologist, has offices in 812 Lancaster Bldg., Calgary, Alberta, Canada. He lives at 3026 Glencoe Road.

1923

Lawrence Thomy is at present enrolled in the Graduate School of the University of Michigan, specializing in Chemical Engineering. His address is 1108 Prospect St., Ann Arbor.

1924

R. H. Brumley can be addressed, Box 71, Seminole, Oklahoma.

1925

Charles L. Martin is now employed by the Climax Molybdenum Company at Climax, Colorado. He visited the campus the early part of October.

Lorenz A. Fisher, who is with the Atcheson Graphite Company, Niagara Falls, N. Y., lives at 2438 LaSalle Street.

M. L. Atkinson is Assistant Superintendent, Central Division, Phillips Petroleum Co., 1211 First National Bank Bldg., Oklahoma City, Okla. He lives at 200 South East 37th Street.

Paul A. Terry, ex '25, has returned to Tulsa from California. He is living with M. L. Terry, '20, at 1241 South Birmingham Place, Tulsa, Okla.

1926

E. H. Griswold is Vice-president of the Rushwold Oil Company at Dallas, Texas. His mailing address is P. O. Box 1207, Midland, Texas.

H. E. McBride is now living at 509 West Woodbine St., Kirkwood, Mo.

Hudson Thatcher is with the Pittsburgh Testing Laboratories, St. Louis County.

H. S. Thomas is with the Transwestern Oil Company, successors to Slick-Urschel Oil Co., Oklahoma City.

James D. Behnke is now living at St. Clair, Mo.

C. A. Anderson is Chief Draftsman with the Oil Country Supply Co. at Coffeyville, Kansas.

1927

R. H. Knight is employed by Air Reduction Sales Company, 630 South 2nd Street, St. Louis. He lives at 2504 Sutton Blvd., Maplewood.

Frank K. Seydler is now located in Chicago, with the National Carbon Company at 230 North Michigan Boulevard.

E. R. Cushing is now employed by Certain-teed Products Company at Akron, New York.

F. H. "Satchel" Conley is with Phillips Petroleum Company at Corpus Christi, Texas.

1928

John R. Heckman is now District Sales Manager for the General Alloys Company of Chicago.

Harold R. Kilpatrick, with the Laclede Steel Co., 1317 Arcade Bldg., St. Louis, lives at 216 Elm Ave., Glendale, Kirkwood, Mo.

C. J. Creekmore, ex '28, is associated with his father in the Creekmore Drilling Company. He lives at 2752 North West 21st Street, Oklahoma City.

R. P. Baumgartner's new address is 101 Philander Street, Pittsburgh, Pa. He is employed by Westinghouse Electrical and Manufacturing Company at East Pittsburgh.

1929

Arthur K. Kemp is at present with the Gulf Oil Company at Chase, Kansas.

H. D. Monsch's new home address is 456 Highland Avenue, Palisades Park, N. J.

John Hahn is operating two motion picture theaters, one in Morning Sun, and the other in Winfield, Iowa. He was a campus visitor in October.

W. B. Davis is now General Superintendent of the Golden Anchor Mining Company at Burgdorf, Idaho.

1930

Leonard L. Ellis is now Assistant Superintendent of Cerro de Pasco Copper Corporation at Casapalca, Peru.

Dick Payne, formerly with Compania Huanchaca de Bolivia at Pulacayo, Bolivia, has returned to the states.

Myron F. Thomas is now living at 8042 Jeffery Ave., Chicago.

E. C. (Jimmie) Hoeman is Junior Chemical Engineer in the Chemical Engineering Division at the Wilson Dam Fertilizer Works of the Tennessee Valley Authority. He is engaged in supervising the operation of experimental electric furnaces in research in the production of ferro-alloys, high-alumina cements, and other problems. He is living at 520 North Poplar St., Florence, Alabama.

Lloyd R. Lacy is with Phillips Petroleum Company, located at Bartlesville, Okla.

1931

Raymond J. Haffner's new address is Engineer Office, Binghampton, New York.

G. L. Traband, with the Standard Oil Company of Indiana, lives at 835 Acton Avenue, Wood River, Illinois. He visited M. S. M. in October.

J. Heber Martin, ex '31, is with the Iverson Tool Company at Odessa, Texas.

1932

Edward W. Mockobey—118 Fifth Ave., South Charleston, West Virginia.

Andrew W. Kassay—2024 Nevada Street, Toledo, Ohio.

John T. Sturm, Jr., '32, is a member of the firm of Sturm and MacNish, Consulting Engineers at Webster Groves, Mo. He lives at 646 North Forest Ave., Webster Groves.

1933

Thorpe Dresser is now employed in the Development Department of the Sinclair Refining Company at East Chicago, Indiana. He is living at 1711 Cleveland Ave., Whiting, Indiana.

Ted W. Hunt's new address is Box 1051, Binghampton, New York.

J. H. "Pat" Hell, now in the Philippines, may be reached by addressing him Box 260, Baguio, Philippine Islands.

William Koopmann's change of address is 3715 Meramec Street, St. Louis, Mo.

Chas. R. Hubbard's present address is Paracale, Camarines Norte, Philippine Islands.

E. W. Gieseke, with Tennessee Mineral Corporation at Staley, North Carolina, was a campus visitor on October 15th.

Rex E. Pinkley is now Plant Superintendent of the U. S. Gypsum Company at Sweetwater, Texas.

Bill Lenz has joined the Research Staff of Fansteel Metallurgical Corporation at North Chicago. He lives at 1113 Popular St., Waukegan, Illinois.

John O. Farmer, with Otis Pressure Control, Inc., may be addressed Box 383, Hobbs, New Mexico.

Pat Hell writes a very interesting letter from Suyoc, Mankayan, Mountain Province, Philippine Islands.

1934

R. C. Cole is employed by the Western Geophysical Company. His address is R. F. D. No. 1, Box 283A, El Paso, Texas.

R. G. Hudson was married on November 20th to Miss Ellen McCombs of Andover, Ohio. They are now at home at 801 East Exchange Street, Apartment 4, Akron, Ohio.

Wm. R. Springer, with the Interlake Iron Corporation at Toledo, Ohio, gives 8—21st Street as his mailing address.

Herb Hoffman, who is employed by the Northern Peru Mining and Smelting Company at Trujillo, Peru, has recently been promoted to Mill Superintendent.

SOCIAL CALENDAR

School Year 1937-1938

Jan.	Sat. 29	St. Pat's Board
Feb.	Sat. 5	Officers Club
	Sat. 13	Theta Kappa Phi
	Sat. 19	St. Pat's Board
Apr.	Sat. 9	Theta Tau
	Sat. 16	St. Pat's Board
	Fri. 22	Alpha Lambda Tau
	Sat. 23	Pi Kappa Alpha
	Fri. 29	Sigma Nu
	Sat. 30	Kappa Sigma
May	Fri. 6	Kappa Alpha
	Sat. 7	Triangle
	Sat. 14	Sigma Pi
	Sat. 21	Theta Kappa Phi
	Sat. 28	Lambda Chi Alpha

Alumni News

(Continued)

A. H. Walther of the National Aniline and Chemical Company, Buffalo, New York, visited his Alma Mater during October.

George Hale is with the Missouri State Highway Department in the Kirkwood Office.

Richard E. Taylor's present business connection is General Steel Castings Corporation at Eddystone, Pa.

Robert L. Cunningham, who is with Stanolind Oil and Gas Company, has been transferred from Stafford to Hoisington, Kansas. He lives at 360 West 5th Street, Hoisington, Kansas.

R. L. Stone, is an instructor in the Ceramic Engineering Department at the North Carolina State College of Agriculture and Engineering of the University of North Carolina at Raleigh.

1935

R. C. Solomon is now in the Metallurgy Department of the Tennessee Coal, Iron and Railroad Company at Insley, Alabama.

Clare J. Thorpe, employed by the Darby Refining Company of Wichita, Kansas, visited the campus October 15th.

Louis W. Holtman, who is with Shell Petroleum at Chicago, is stationed in their Motor Testing Laboratory at the East Chicago Refinery. He lives at 21 Warren St., Hammond, Indiana.

L. C. Spiers, Production Department, Carnegie-Illinois Steel Co., lives at 7808 South Shore Drive, Chicago, Ill.

W. A. Howe, has been transferred from the laboratory of the Standard Oil Company of New Jersey at Bayonne, to the Sales Engineering Department, and is now working at 26 Broadway, New York City. After November 10th his residence will be: The Sevilla, Sip Avenue and Hudson Boulevard, Jersey City, N. J.

1936

H. J. Pfeifer is now living at 1818 Cleveland Ave., Niagara Falls, N. Y.

J. C. Turk—118 Electric Ave., Rochester, New York, is employed by Eastman Kodak Company.

Basil Osmin, who was a special student in Metallurgy in the class of '36, will sail on the "Jean Jadot" on November 11th to Antwerp, and from there will go to Germany, where he expects to study welding methods as practiced in the German plants. He expects to return to the States early next year.

Don Clarke, who is now with the American Steel and Wire Co., lives at 3552 Normandy Ave., Cleveland, Ohio.

1937

Frank C. Appleyard, who is Plant Manager for U. S. Gypsum Company at Sweetwater, Texas, resides at 1005 Oak St.

M. E. Green is now Instructor in the Department of Ceramic Engineering, Iowa State College, Ames, Iowa, and also Junior Ceramic Engineer, Engineering Experiment Station.

Frank Millard's most recent address is 815 Coleman Avenue, Corpus Christi, Texas.

Jim McGregor and his wife, the former Beryl Willet of Rolla, visited with their families over the Thanksgiving holidays. Mrs. McGregor formerly was an employee of the M. S. M. Hospital.

T. Winston Wommack and Miss Mary Terrill were married December 1st.

A. H. Barclay, Jr., is Junior Engineer with the United States Gypsum Company at Fort Dodge, Iowa.

Fred K. Vogt, Jr., is employed by Laclede Light and Gas Company, St. Louis, Mo. He resides at 5122 Virginia Avenue.

J. W. Frame is now attending Lehigh University at Bethlehem, Pa. He lives at 228 Wall Street, Bethlehem.

W. W. "Ben" Culbertson is attending Case School of Applied Science at Cleveland.

Chas. K. Tharp, ex '38, is employed by the Texas Electric Steel Casting Company at Houston, Texas.

Robert W. Gregory, ex '40, is now attending Junior College in Taft, California.

G. W. Dickinson is employed by the United States Gypsum Company, and is now located at Lewistown, Montana.

W. R. Jarrett is in the St. Louis office of General Electric Co. His home address is 1310 Temple Place, St. Louis.

Walter E. Luder is with the Aluminum Company of America at New Kensington, Pa. He gives his address as the Aluminum Club.

C. G. Heslet, who is with the Cotton Belt Railroad, lives at 524 South Fannon St., Tyler, Texas.

Max S. Humphreys, ex '37, is Draftsman in the Engineering Department of the Universal Atlas Cement Company of Chicago. His mail address is Box 732 Palatine, Ill.

AUTHOR OF CIRCULAR

"Operations and Costs at the St. Joe Mining and Milling Company, Boulder, Colorado" is the title of an Information Circular of the U. S. Bureau of Mines written by Joseph R. Guiteras, formerly in the Metallurgy Department of M. S. M. Guiteras is now Mining Engineer, metal mining methods section, Mining Division, Bureau of Mines.

NEW YORK MEETING PLANNED

The Alumni living in the Eastern Section will have their annual meeting, as usual, at the time of the winter session of the American Institution of Mining and Metallurgical Engineers, which is to be held the week of February 14th. There will be a cocktail party around five o'clock in the afternoon, and a dinner-smoker at seven o'clock, all of which will be held in the Waldorf-Astoria. No further details are available at this time, but if you expect to be in New York at this meeting, please write to Mr. E. S. Tompkins, 30 Church Street, New York City, and enclose a check for $3.50 to cover the cost of the dinner.

PITTSBURGH ALUMNI MEET

On December 10th an informal meeting of the MSM Alumni in the Pittsburgh district was arranged by C. H. Dresbach '29 for the express purpose of meeting Director Chedsey.

Those present were:

C. H. Dresbach '29, Geophysicist, Gulf Research and Development Co.; J. P. Gill '18, Vanadium Alloy Steel Co., Latrobe, Pa.; G. L. Baxter, Aluminum Co. of America, New Kensington, Pa.; R. W. Ahlquist '24, Assistant Profesor, E. E. Dept., University of Pittsburgh; W. G. Hippard, '20, Mining Engineer, Northern Coal Mines, Republic Steel Co.; O. E. Klockman, ex '08, Project Engineer, Koppers Co., Pittsburgh, Pa.; Thos. O. English '29, Electrical Buyer, Aluminum Co. of America; R. P. Baumgartner '28, Laboratory Supervisor, Westinghouse Electrical and Manufacturing Co.; E. S. Wheeler '22, Climax Molybdenum Co., Langeloth, Pa.; L. W. Meyer '36, Engineering Division, Aluminum Co. of America; W. O. Keeling '23, Research Engineer, Koppers Co., Pittsburgh, Pa.; W. E. Luder '37, Planning Department, Aluminum Cooking Utensil Co.; J. J. Beinlich '33, Met. Dept., Clairton Works, U. S. Steel Corporation; W. Irwin Short '26, Assistant Professor, C. E. Dept., University of Pittsburgh.

W. Irwin Short is acting as temporary secretary of the Pittsburgh group. He is in the Department of C. E. Engineering of the University of Pittsburgh, Room 713, Cathedral of Learning.

NEW ADDRESSES

Argus, G. L. '24—2511 Mitchell Ave., St. Joseph, Mo.

Backer, W. H. '24—513 East 17th St., Baxter Springs, Kansas.

Baker, Willard A. '36—819 South 49th St., Philadelphia, Pa.

Barnard, C. F. '20—118 Lucretia St., Oakland City, Indiana.

Benedict, R. R. '08—431 North Kennon Ave., Arlington, Virginia.

Berry, George F., Jr. '24—119 South Summit St., El Dorado, Kansas.

Bolles, F. C. '22—701 Grayson St., San Antonio, Texas.

Bowman, K. M. '22—3213 Wisconsin Ave., Apartment 23, Washington, D. C.

Casselman, L. O. '20—784 Cherry St., Springfield, Mo.

Chapin, E. F. '23—820 Palo Dess St., Amarillo, Texas.

Craif, S. E. '26—36 Glenwood Ave., Tooele, Utah.

Czyzewski, John B. '34—Box 73, R. D. No. 2, Englishtown, N. J.

Darnell, W. E. '32—Box 26, Bismark, Mo.

Devereux, Andrew '24—7941 South Dobson Ave., Chicago, Ill.

Ehlers, William '13—8116 Teasdale Ave., St. Louis, Mo.

Garst, O. C. '33—1217 Elgin Ave., Houston, Texas.

Gaston, J. E. '34—214 South Broadway, Pittsburg, Kansas.

Gevecker, A. C. '31—5036 Moffett Ave., St. Louis, Mo.

Gross, Bernard, Jr. '33—118-40 Metropolitan Ave., Kew Gardens, N. Y.

Hall, Harold M. '33—Box 903, Ft. Peck, Montana.

Helmerichs, J. F. '22—15919 Hazel Ave., Cleveland, Ohio.

Herzog, M. L. '33—4214 Bates Ave., St. Louis, Mo.

Hoener, Alan J. '36—18 West Cedar St., Webster Groves, Mo.

Hoffman, Emil D. '35—120 North 18th St., East Orange, N. J.

Hoffman, Richard H. '36—1095 North Van Ness Ave., Fresno, Calif.

Holderbaum, C. W. '33—466 Midland Ave., Little Rock, Arkansas.

Hollister, S. E. '13—502 North Bright St., Whittier, Calif.

Holt, Frederic H. '35—8 State St., Schenectady, N. Y.

Huckins, J. G. '23—254 Custom House, Denver, Colo.

Hudson, R. G. '34—801 East Exchange St., Apartment 4, Akron, Ohio.

Knight, W. E. H. '37—6 Randolph Terrace, Radburn—Fiar Lawn, N. J.

Lange, R. C. '37—Route 2, Pampa, Texas.

Larwood, M. B. '34—2029 Niagara St., Buffalo, N. Y.

Lawrence, N. M., ex '16—40 North San Rafael Ave., Pasadena, Calif.

McDill, Wm. H. '35—105a Monroe St., Jefferson City, Mo.

Merchie, Leo H. '33—2131 Third St., Moline, Ill.

Moore, Wm. R., ex '32—Resident Engineer, Kinsey Engineering Co., Lemay Ferry Sanitary Sewer District, 9800 S. Broadway, St. Louis, Mo.

Murphy, M. F. '31—1815 Engineers Bldg., 205 W. Wacker Drive, Chicago.

Runder, R. H. '32—c/o U. S. Engineer Office, Galveston, Texas.

Rushmore, W. L. '27—Box 758, Chase, Kansas.

Rucker, Booker H., Jr. '30—622 Byers Ave., Joplin, Mo.

Park, Albert '10—P. O. Box 911, Casper, Wyoming.

Salmon, J. C., Jr. '22—Homer, Louisiana.

Schapiro, Leo '24—1717 East 68th St., So. Shore Station, Chicago.

Scheer, H. O. '30—1722 South 5th St., Springfield, Ill.

Schneider, R. E. '36—222 N. Buckhannan Ave., Edwardsville, Ill.

Schwartz, G. N. '33—4958 Miami St., St. Louis, Mo.

Schweickhardt, Wm. K. '28—3249 Lafayette Ave., St. Louis, Mo.

Springer, Wm. R. '34—1940 Washington Ave., Toledo, Ohio.

Stewart, T. J., Jr. '34—520 N. 23rd St., East St. Louis, Ill.

Stokes, J. E. '31—223 Fifth St., N. W., Oelwein, Iowa.

MAIL RETURNED

Chamberlain, Harold L. '32

Huffman, E. A. '35

Jewell, A. B. '23

Letts, G. B. '25

McClanahan, A. L. '37

Dydstrom, Richard '32

Shaw, O. C., ex '05

Waverly, F. A.

CHANGES OF ADDRESS

Vogt, F. K. '37—5238a Louisiana Ave., St. Louis, Mo. (Laclede Gas Light)

Benner, C. E. '37—55 Pomeroy St., Pittsfield, Pa.

Taylor, H. J. '99—464 Dewey Ave., St. Paul, Minnesota.

Ten Eyck, W. E. '23—2012 Cedar St., Bakersfield, Calif.

Vogt, J. G. —— 3882 Humphrey Ave., St. Louis, Mo.

From Calgary, Alberta, Canada, comes this picture of the children of J. S. Irvin, '12. From left to right, Carol 2, Joe 5, Aileen 11, and Mitchell 15. The picture was taken by Mr. Irwin himself during November of this year.

Walker, J. P. '11—323—157th St., Calumet City, Ill.

Weiss, C. B. '27—785 Holly St., Memphis, Tenn.

White, C. S. '32—P. O. Box 228, Greenville, Mississippi.

Williams, A. J. '33—1023 Jackson St., St. Charles, Mo.

Cushwa, Claude C., '14—Box 1001, Grass Valley, California.

WELL REPRESENTED

M. S. M. is well represented in the Milling Department of the Utah Copper Company with the following alumni:

E. W. Engelmann, '11—Superintendent, Magna Plant.

C. G. Williams, ex '11—Metallurgical Engineer, Magna Plant.

Joe E. Ribotto, '35—Metallurgical Clerk, Arthur Plant.

Neil Plummer, '36—Flotation Operator, Magna Plant.

LOCAY BOYS

A paper entitled "The Mechanism of Steel Hardening and Tempering as Indicated by Coercive Force Measurements" was presented by R. S. Dean in collaboration with Prof. C. Y. Clayton at the National Metal Congress and Exposition held in Atlantic City, N. J., from Oct. 11 to 22.

R. S. Dean, son of the late Prof. George Reginald Dean and alumnus of M. S. M., is Chief Engineer, Metallurgical Division, U. S. Bureau of Mines.

URGES THOUGHTFULNESS

In his first appearance before the student body newly appointed Director W. R. Chedsey urged MSM students to use thoughtfulness in consideration of his suggestion for more culture among Engineers. Later at the mass meeting Coach Gale Bullman spoke on "Athletics."

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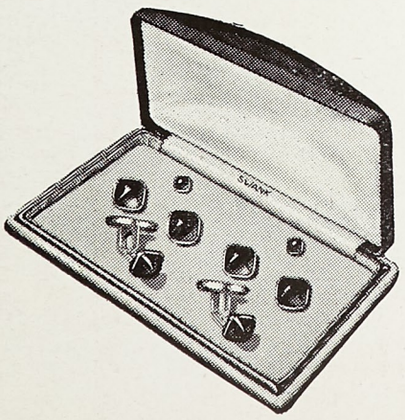

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